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SUMMARY

Problem

Accounts of postdeployment health problems incurred by Gulf War veterans are many and varied. These accounts have reported a wide range of symptomatology, as well as put forth a large number of potential causes of the reported medical problems

Objective

The present study seeks to compare the post-conflict hospitalization rates of active duty personnel deployed to the Gulf War with the rates of personnel from similar units returning from the Vietnam Conflict, as well as to examine rate differences among the individual Gulf units.

Approach

The hospitalization incidence of Gulf War and Vietnam veterans was analyzed by contrasting the crude and age-adjusted admission rates for varying troop categories (infantry troops, artillery troops, combat engineers, and service support troops) in the five-year periods immediately following the two engagements. Hospital admissions of the combat veterans groups were also compared by their proportional distributions of disease categories.

Results

There were no significant differences in hospitalization rates among the infantry, artillery, engineering, and service support units deployed to the Gulf War. Further, overall, and in four of the five postdeployment years, the aggregated Gulf War veterans exhibited lower hospitalization rates when compared with their Vietnam counterparts. In comparing hospital admission categories, differences existed between the Vietnam veterans and Gulf War veterans only in their proportions of 'Infective and Parasitic' diseases, 'Genitourinary' disorders, and 'Musculoskeletal' disorders.

Conclusion

The lack of differences in the hospitalization rates of various Gulf War units in differing locations on the battlefield provides no support to the notion that a specific environmental exposure is responsible for deleterious health effects on Gulf War veterans. That hospitalization rates of returning Gulf War veterans were either lower or comparable to the rates of veterans returning from a previous combat engagement also provides no support to the notion of an environmental exposure above and beyond that which might be associated with the demands of war itself.

A Comparison of Postdeployment Hospitalization Incidence Between Active Duty Vietnam and Gulf War Veterans

Introduction

Accounts of postdeployment health problems incurred by Gulf War veterans are many and varied. These accounts have reported a wide range of symptomatology, which have included fatigue, sleep disturbances, joint pain, muscle weakness, depression, inability to concentrate, dental anomalies, skin rashes, gastrointestinal disturbances, headaches, and other health problems. [1-8] Paralleling the numerous maladies attributed to Gulf War deployment are the many causes advanced as responsible for the medical irregularities. The causes put forth include exposures to chemical/nerve agents,[9-11] exposure to petrochemicals associated with the Kuwait oil fires,[12] exposure to depleted uranium rounds on the battlefield,[13] ingestion of pyridostigmine bromide,[14] contraction of an infectious disorder such as leishmaniasis,[15] multiple chemical sensitivities,[16-17] and combat stress.[18-20] In short, many Gulf War veterans report symptomatology that they attribute to their deployment to the Gulf War theater of operations.

However, two large epidemiologic studies have indicated that postdeployment hospitalizations and deaths among Gulf War veterans have been incurred at rates not statistically different than their nondeployed counterparts.[21-22] Still, questions persist. The present investigation seeks to shed light on two different aspects of hospitalization incidence among Gulf War Veterans. First, the present study compares the postdeployment hospitalization incidence of United States Marine Corps (USMC) Gulf War veterans with those of veterans returning from a previous engagement – the Vietnam Conflict. Second, in an attempt to gain insights into the effects of potentially different battlefield exposures, the present study further analyzed the hospitalization incidence of Gulf War and Vietnam veterans by contrasting the admission rates for varying troop categories

(infantry troops, artillery troops, combat engineers, and service support troops) that had differing duties and varying battlefield locations during their combat deployments.

Method

Data sources – personnel

Marine Corps units returning from Vietnam at the end of USMC involvement in that conflict (March – June, 1971 time frame) were first identified via a Marine Corps history,[23] and then diaries for these units were obtained from the Records Service Section, Headquarters USMC. The units returning in this time frame were all 1st Marine Division troops and included six infantry battalions (the 1st, 2nd, and 3rd battalions of both the 1st and 5th Marine Regiments); two artillery battalions (1st and 2nd battalions of the 11th Artillery Regiment); one engineer battalion (1st Engineer Battalion); and four service support battalions from the 1st Force Service Regiment (Headquarters and Service Battalion, Supply Battalion, Motor Transport Battalion, and Maintenance Battalion).

Diaries for these units identified 16,980 unique Service Numbers (SNs). Because Marine Corps medical records starting in the 1970s identify individuals by social security number (SSN) rather than SN, the service numbers from the unit diaries were then matched against a file maintained at the Defense Manpower Data Center, Monterey Bay, California, that contained both SNs and their corresponding SSNs. Of the 16,980 SNs, social security numbers were ascertainable for 15,194 personnel (89.5 percent). Nonmatches were not systematically tied to any particular units but instead likely resulted from incomplete data as the military services transitioned from using SNs to SSNs at a time when many individuals were exiting the service.

The SNs and SSNs were then matched against Department of Defense (DoD) Loss Files, also maintained by the Defense Manpower Data Center, that indicated the date each individual separated from service. Of the 15,194 personnel whose SSN and SN were both ascertainable, 3300 were excluded from the study for the following reasons: 81 were members of another service branch who had been attached to USMC units and whose medical histories were unavailable for this study; 1637 personnel showed a separation from service immediately upon return from Vietnam and therefore could not be medically tracked for any period of time; and service departure date was indeterminable on 1582 individuals.

Thus, 11,894 enlisted male Marines were identified who served in Vietnam, and who did not separate from military service immediately upon their return from South East Asia. These 11,894 men were comprised of 7009 Marines in infantry companies, 1174 Marines in artillery batteries, 640 Marines in engineering companies, and 3071 Marines in the service support companies.

The data indicating service in the Gulf War, demographic variables for Gulf War troops, and military separation dates for Gulf War veterans were also obtained from the Defense Manpower Data Center. Because the comparison group (Marines returning from Vietnam) was exclusively male, and the small number of non-enlisted personnel had been excluded, only enlisted male Marines were included in the Gulf War study population as well. Similarly, because only 1st Marine Division troops were active at the end of the Vietnam conflict, the Gulf War study population was restricted to troops of the 1st Marine Division. An historical monograph [24] of 1st Marine Division activities during Desert Storm was used to verify the presence on the battlefield of the combat units used in this study.

The Gulf War study population was limited to the same four troop categories present at the end of USMC involvement in the Vietnam conflict: infantry troops, artillery troops, combat

engineers, and service support troops. Seven infantry battalions of the 1st Marine Division were identified from the monograph as having actively participated in the ground war. The units composing the infantry group were the 1st, 2nd, and 3rd Battalions of the 7th Marine Regiment; the 1st Battalion of the 1st Marine Regiment; the 1st Battalion of the 5th Marine Regiment; the 3rd Battalion of the 9th Marines; and the Detachment 3rd Light Armored Infantry Battalion. Similarly, the 1st, 3rd, and 5th Battalions of the 11th Marines were identified in the monograph as active in the ground war and formed the artillery group for the Gulf War population. The 1st Combat Engineer Battalion was identified as actively participating during the ground war and constituted the group for the Gulf War that paralleled the combat engineer unit in the earlier conflict. Lastly, the service support group for the Gulf War was composed of troops from the following Force Service Support Group units: the Headquarters and Service Battalion, the 1st Supply Battalion, the 1st Maintenance Battalion, the 7th Motor Transport Battalion, the 1st Landing Support Battalion, the 7th Engineer Support Battalion, the 1st Medical Battalion, Marine Service Support Group – 11, Marine Service Support Group – 13, and the Headquarters Service Detachment. These service support units were all identified as having been in the theater and having strengths greater than 100 personnel.

Altogether then, there were 10,878 Marines who were identified as having served in the Gulf in 1st Marine Division units that paralleled the units that returned from Vietnam at the end of that conflict. These 10,878 men were composed of 4374 Marines in infantry companies, 1588 Marines in artillery batteries, 616 Marines in engineering companies, and 4300 Marines in service support companies. Table 1 contrasts the numbers and types of troops at the beginning of the Vietnam and Gulf War postdeployment periods.

Data sources – hospitalizations

Hospitalization data for enlisted Marines returning from the Vietnam conflict were extracted from inpatient records maintained at the Naval Health Research Center. Diagnoses accompanying the hospital admissions incurred by Vietnam veterans during the five-year postdeployment period of this study were recorded in *International Classification of Diseases, Eighth Revision* (ICD-8) format.

Hospitalization data for enlisted Marines returning from the Gulf War were obtained from the Defense Manpower Data Center. Diagnoses accompanying the hospital admissions incurred by Gulf War veterans during the five-year postdeployment period of this study were recorded in *International Classification of Diseases, Ninth Revision* (ICD-9) format.

Each hospitalization record could contain up to eight diagnoses for a single admission. Hospitalization admissions for each deployed individual from the time of his return from the combat theater until the date five years from that return, or until his date of exit from service if less than five years, were included in the analyses. Individuals with injury admissions coded as resulting from battle wounds (DoD injury cause codes 400-479) were excluded from this study. Because reporting of admissions to the treatment facilities aboard aircraft carriers ceased in 1990, the six admissions aboard carriers recorded for the Vietnam cohort were removed from the analyses.

Statistical analyses

Crude rates of hospitalization during the postdeployment periods were calculated for each of the four troop categories. The rates were calculated per 1000 persons per day (person-days). An individual who remained in the service for more than five years after his return from the conflict would contribute 1825 person-days (365 x 5) to the denominator (exposure period); an individual leaving the Marines exactly four months after his return from combat would contribute 120 person-days to the denominator. In addition to overall rates for the five-year postdeployment period, rates were computed individually for each postdeployment year.

As a preliminary analysis indicated that there was a statistically significant difference in the ages of the returning veterans (mean age at return for Vietnam veterans of 22.3 versus 24.5 for Gulf War veterans), the crude hospital rates were age-adjusted. Because of the relative youth of forces deployed to the military engagements, age stratification for the adjustments was by narrow, four-year intervals. Table 2 shows the frequencies and percentages of person-days in each age group across the postdeployment periods. Age-adjustment was performed with the direct adjustment method, using the combined Vietnam and Gulf War group as the standardized population.[25] Ninety-nine percent confidence limits were computed for the age-adjusted rates.

Hospital admissions of the combat veterans groups were also compared by their proportional distribution within the following diagnostic categories: infective and parasitic, neoplasms, endocrine, blood and blood-forming, mental, nervous system, circulatory, respiratory, digestive, genitourinary, skin and subcutaneous tissue, musculoskeletal, congenital anomalies, symptoms and ill-defined, injuries, adverse effects, supplementary classifications, and multiple categories. All categories except Injuries, Adverse Effects, and Supplemental Classifications directly correspond to the ICD diagnostic categories. However, in order to compare the proportions of

admissions corresponding to 'injuries' alone, the diagnoses in the ICD category of 'Injuries and Poisonings' for adverse effects of medicinals and other external agents (ICD-9 diagnoses 960 – 994, 909) were separated into their own unique category. Additionally, admissions in the 'Injury and Poisonings' category coded as complications of surgical care (996-999) were placed with the Supplemental Classifications category admissions. These two minor data adjustments allowed 'injuries' to be reported as a stand-alone category of hospital admissions. All hospitalizations having diagnoses that fell into two separate diagnostic categories were reported in the 'multiple category' percentage. After the proportions corresponding to each diagnostic category were determined, 99 percent confidence limits were calculated for each category percentage.[26]

Results

Rate comparisons

Figure 1 is a display of the age-adjusted hospitalization rates and confidence intervals of the four troop types composing the Vietnam and Gulf War veteran cohorts. For the Vietnam veterans, while there were no significant differences among the Artillery, Engineer, and Service Support groups, the rate of postdeployment hospitalizations for the Infantry troops was significantly higher when compared with those other three groups. Among Gulf War veterans, there were no statistically significant differences between any of the four troop categories.

Crude and age-adjusted hospitalization rates by post-conflict year for the Vietnam and Gulf War cohorts are presented in Table 3. Hospital admission rates for Vietnam veterans were significantly higher overall and for the first, third, fourth, and fifth post-conflict years when compared with the rates of Gulf War veterans. As can be seen in this table, there was a general decline in hospitalization rates among both groups in the years following the conflicts. Of the

veterans hospitalized, the Vietnam cohort and the Gulf War cohort both averaged 1.24 admissions per individual.

Table 4 is a year-by-year comparison of postdeployment hospitalization rates for the Infantry troops from the two conflicts. The rates of the Vietnam infantry troops were significantly higher than the Gulf War infantry troops across the five-year postdeployment period and in the first, fourth, and fifth post-conflict years. Table 5 is a display of the year-by-year comparisons between the Artillery troops serving in the Vietnam and Gulf War conflicts. There were no significant differences in postdeployment hospitalization rates among the artillery groups. Table 6 is a presentation of the yearly rate comparisons between the Combat Engineer groups serving in the two conflicts; there were no statistically significant differences between the hospitalization incidence incurred by the engineering groups active in the two conflicts. Table 7 contrasts the yearly postdeployment rates of the fourth study group – Service Support troops. As can be seen in this table, the service support troops deployed to Vietnam exhibited a significantly higher rate of hospitalizations than the Gulf War service support troops across the five-year post-conflict period, as well as significantly higher rates in the third and fifth postdeployment years.

Admission type comparisons

Table 8 contrasts the distribution of illness categories incurred by the Vietnam and Gulf War veterans across the five-year post deployment period. Significant differences existed between the two groups of veterans in the proportions of 'Infective and Parasitic' diseases, 'Genitourinary' disorders, and 'Musculoskeletal' disorders, with the Vietnam veterans having the higher proportion within the first two categories and the Gulf War veterans having the higher proportion of musculoskeletal disorders. The specific three-digit ICD-9 diagnoses that were most prevalent among Gulf War veterans within the musculoskeletal category included: internal derangement of

joint (30 percent), synovium tendon and bursa (16 percent), and other derangement of joint (14 percent). While slight differences exist in the coding between ICD-9 and ICD-8, the diagnoses of Gulf War veterans are very similar to the types of musculoskeletal disorders incurred by Vietnam veterans: derangement of joint (25 percent), other unspecified disorder of joint (15 percent), synovitis bursitis tenosynovitis (12 percent), and intervertebral disc disorder (10 percent). The difference in proportions of infective disorders between the two cohorts was largely due to the considerably higher category percentage among Vietnam veterans in their very first year after return from the combat theater; while infective disorders comprised 15 percent of the Vietnam veterans hospitalizations in the first postdeployment year, this illness category averaged but slightly more than 5 percent in the four subsequent years.

Discussion

The present study sought to investigate any differences or similarities between the post-war hospitalization experiences of Gulf War and Vietnam veterans. Much controversy has surrounded the postdeployment illness incidence of Gulf War veterans, and the current study juxtaposed the hospital admission incidence of Marines deployed to the Gulf with the hospital incidence of a similar group of Marines deployed to an earlier military conflict. The strength of this study lies in the similarities of the comparison groups – for both wars, the hospitalization incidence of infantry, artillery, combat engineer, and service support units of the 1st Marine Division were contrasted for the years immediately following the veterans' return from the conflicts. Similarly, both the Vietnam and Gulf War study groups were composed of troops that were in-theater at the end of USMC involvement in those conflicts. One caveat warrants mention here. As the title of this study implies, the current investigation was only able to track the hospitalizations of Marines that remained on active duty. Therefore, if any differences in hospitalization rates exist between veterans who remain in service and those that do not, the

present study would not be able to track such differences. Nevertheless, the reported overall hospitalization rates of the Gulf War and Vietnam veterans in this study are based on 9.6 million and 6.6 million postdeployment person-days respectively, and therefore provide considerable insights into the post-conflict experiences of two groups of veterans.

Interestingly, while the infantry troops deployed to Vietnam showed the highest rate of hospital admissions among the four unit-types deployed to that conflict, there were no significant differences in hospitalization rates among the infantry, artillery, engineering, and service support units deployed to the Gulf War. Any hypothesized environmental exposure thought to have had a negative health effect on Gulf War veterans either affected the four troop types in a uniform fashion, or is not readily apparent through analyses of these USMC hospitalizations.

Overall, and in four of the five postdeployment years, the aggregated Gulf War veterans exhibited lower hospitalization rates than did their Vietnam counterparts. Separately, the infantry and service support units deployed to the Persian Gulf had lower postdeployment hospitalization rates than did the Vietnam veterans. The combat engineer and artillery units deployed to the Gulf and Vietnam did not differ significantly in their respective rates of hospitalization. Also, among veterans who required hospitalization, the two cohorts did not differ in subsequent admissions; both the Vietnam and Gulf War groups averaged 1.2 hospital admissions among those who had at least one hospitalization.

The categories of illnesses incurred by the Gulf War and Vietnam veterans of this study were, by and large, not that dissimilar. The returning Vietnam veterans had a higher percent of their admissions comprised by infective/parasitic disorders and, to a lesser extent, genitourinary problems. The higher percent of infectious disorders was largely due to the admissions in this category within the first year of the veterans' return – a finding not unexpected given the tropical

nature of the Southeast Asia theater of operations.[27] The Gulf War veterans had a higher proportion of their overall admissions comprised by musculoskeletal problems. However, the specific types of musculoskeletal disorders incurred by Gulf War veterans were not substantially different from their Vietnam counterparts. The prevalence of musculoskeletal complaints by Gulf War veterans in the DoD's Clinical Evaluation Program has previously been documented.[28]

The lack of differences between the hospitalization rates of Gulf War units (infantry, artillery, engineer, service support) performing different functions in varying locations on the battlefield provides no support to the notion that a specific environmental exposure is responsible for deleterious health effects on Gulf War veterans; any specific environmental risk factor might have been expected to affect these very different groups disproportionately. Indeed, Marines deployed to the Gulf War exhibited rates of hospitalization that are lower or comparable to the rates incurred by Marines returning from a previous ground combat operation. Nevertheless, given the extreme demands of war, all appropriate measures should be taken to adequately prepare such individuals before deployment, to monitor their mental and physical well-being during the deployment, and to provide any appropriate counseling or treatment following their return from war.[29]

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Figure 1. Age-Adjusted Postdeployment Hospitalization Rates by Troop Type

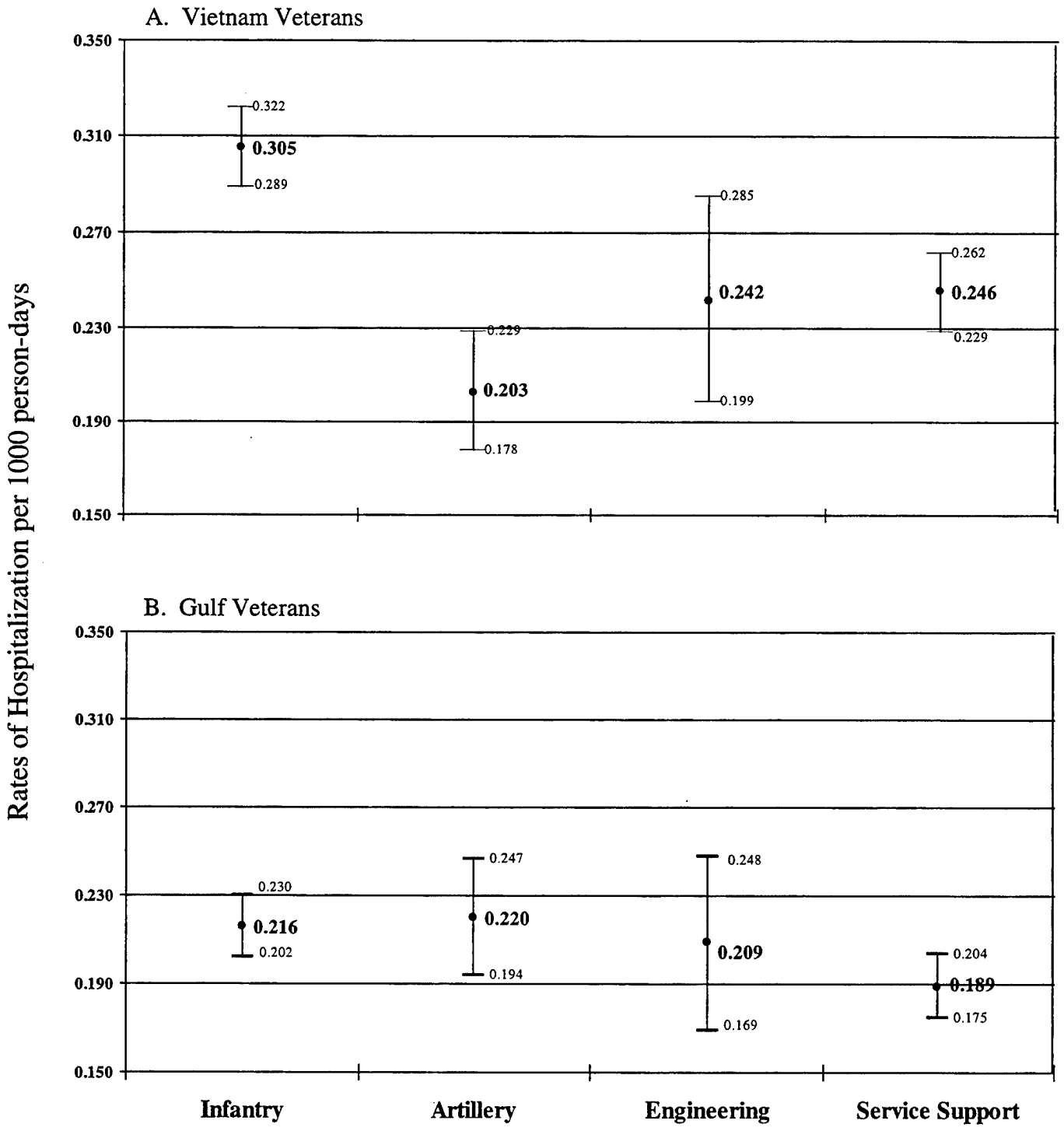

Table 1. Study Population by Troop Type and Cohort

USMC Troop Type	Vietnam	Gulf War
Infantry	7009	4374
Artillery	1174	1588
Engineering	640	616
Service Support	3071	4300
Total	**11894**	**10878**

Table 2. Person-days of postdeployment periods by Age-group and Cohort

Age (years)	Vietnam Veterans			Gulf War Veterans	
	Number of Person-days	Percent of Person-days		Number of Person-days	Percent of Person-days
18 - 21	2849217	43%		1822510	19%
22 - 25	1869323	28%		3665567	38%
26 - 29	603554	9%		1752292	18%
30 - 33	477639	7%		1093720	11%
34 - 37	465913	7%		717147	7%
38 - 41	207208	3%		383125	4%
42 - 45	95320	1%		153450	2%
46 - 49	34788	1%		46189	0%
> 50	14264	0%		12614	0%
All ages	6617226	100%		9646614	100%

Table 3 - Crude and Age-Adjusted Hospitalization Rates by Post-conflict Year and Cohort

Period of Observation	Vietnam Veterans			Gulf War Veterans		
	Crude Rate*	Age-Adjusted*	(99%CI)	Crude Rate	Age-Adjusted	(99% CI)
Year 1	0.327	0.312	(0.295, 0.330)†	0.230	0.233	(0.218, 0.249)
Year 2	0.250	0.243	(0.222, 0.263)	0.203	0.209	(0.190, 0.228)
Year 3	0.270	0.268	(0.241, 0.295)†	0.205	0.209	(0.186, .233)
Year 4	0.222	0.218	(0.190, 0.247)†	0.161	0.160	(0.136, 0.185)
Year 5	0.248	0.245	(0.212, 0.277)†	0.115	0.114	(0.092, 0.136)
Overall	0.286	0.272	(0.261, 0.282)†	0.199	0.206	(0.197, 0.215)

*Rates are computed per 1000 person-days.

† Rate is significantly different than that of Gulf War cohort.

Table 4. Crude and Age-adjusted Hospitalization Rates for Infantry Units by Cohort and Post-conflict Year

	Time Period	Crude Rate*	Age-Adjusted Rate*	99% Confidence Interval	
				Lower	Upper
Vietnam Veterans	Year 1	0.382	0.371†	0.343	0.399
	Year 2	0.260	0.255	0.224	0.286
	Year 3	0.251	0.248	0.209	0.287
	Year 4	0.253	0.249†	0.201	0.298
	Year 5	0.274	0.273†	0.218	0.328
	Overall	0.318	0.305†	0.289	0.322
Gulf War Veterans	Year 1	0.241	0.243	0.220	0.265
	Year 2	0.193	0.201	0.174	0.229
	Year 3	0.229	0.239	0.200	0.277
	Year 4	0.144	0.147	0.110	0.185
	Year 5	0.140	0.134	0.096	0.173
	Overall	0.207	0.216	0.202	0.230

*Rates are computed per 1000 person-days.

† Rate is significantly different than that of Gulf War cohort.

Table 5. Crude and Age-adjusted Hospitalization Rates for Artillery Units by Cohort and Post-conflict Year

	Time Period	Crude Rate*	Age-Adjusted Rate*	99% Confidence Interval	
				Lower	Upper
Vietnam Veterans	Year 1	0.238	0.235	0.191	0.279
	Year 2	0.181	0.184	0.135	0.232
	Year 3	0.216	0.221	0.153	0.288
	Year 4	0.188	0.167	0.097	0.237
	Year 5	0.163	0.139	0.070	0.207
	Overall	0.211	0.203	0.178	0.229
Gulf War Veterans	Year 1	0.237	0.240	0.195	0.284
	Year 2	0.275	0.277	0.217	0.338
	Year 3	0.186	0.182	0.121	0.243
	Year 4	0.185	0.187	0.113	0.261
	Year 5	0.086	0.085	0.031	0.139
	Overall	0.217	0.220	0.194	0.247

*Rates are computed per 1000 person-days.

† Rate is significantly different than that of Gulf War cohort.

Table 6. Crude and Age-adjusted Hospitalization Rates for Combat Engineer Units by Cohort and Post-conflict Year

	Time Period	Crude Rate*	Age-Adjusted Rate*	99% Confidence Interval	
				Lower	Upper
Vietnam Veterans	Year 1	0.240	0.249	0.181	0.317
	Year 2	0.307	0.301	0.203	0.400
	Year 3	0.228	0.220	0.114	0.327
	Year 4	0.166	0.170	0.063	0.277
	Year 5	0.198	0.265	0.119	0.411
	Overall	0.242	0.242	0.199	0.285
Gulf War Veterans	Year 1	0.191	0.209	0.146	0.271
	Year 2	0.252	0.255	0.164	0.346
	Year 3	0.221	0.260	0.144	0.375
	Year 4	0.175	0.172	0.064	0.279
	Year 5	0.057	0.053	0.000	0.119
	Overall	0.195	0.209	0.169	0.248

*Rates are computed per 1000 person-days.

† Rate is significantly different than that of Gulf War cohort.

Table 7. Crude and Age-adjusted Hospitalization Rates for Service Support Units by Cohort and Post-conflict Year

	Time Period	Crude Rate*	Age-Adjusted Rate*	99% Confidence Interval	
				Lower	Upper
Vietnam Veterans	Year 1	0.263	0.240	0.213	0.267
	Year 2	0.247	0.233	0.200	0.266
	Year 3	0.327	0.327†	0.280	0.375
	Year 4	0.196	0.195	0.153	0.237
	Year 5	0.244	0.240†	0.191	0.290
	Overall	0.260	0.246†	0.229	0.262
Gulf War Veterans	Year 1	0.223	0.224	0.198	0.250
	Year 2	0.179	0.182	0.153	0.212
	Year 3	0.188	0.189	0.153	0.226
	Year 4	0.164	0.165	0.127	0.204
	Year 5	0.112	0.113	0.079	0.147
	Overall	0.185	0.189	0.175	0.204

*Rates are computed per 1000 person-days.

† Rate is significantly different than that of Gulf War cohort.

Table 8. Proportional Distribution of Hospitalizations by Diagnostic Category and Cohort

Diagnostic Category	Vietnam		Gulf War	
	Percent of admissions	99% CI	Percent of admissions	99% CI
Infectious & Parasitic Diseases	10.84	(9.05, 12.78)*	2.82	(1.91 , 3.97)
Neoplasm	1.06	(0.55, 1.82)	1.25	(0.68 , 2.06)
Endocrine, Metabolic & Immunity	0.53	(0.20, 1.13)	0.47	(0.16 , 1.04)
Blood & Blood Forming Organs	0.26	(0.06, 0.74)	0.21	(0.04 , 0.65)
Mental Disorders	10.20	(8.45, 12.05)	10.22	(8.35 , 11.72)
Nervous System & Sense Organs	2.54	(1.69, 3.61)	1.88	(1.17 , 2.85)
Circulatory System	3.12	(2.17, 4.29)	2.09	(1.35 , 3.07)
Respiratory System	6.03	(4.70, 7.54)	6.78	(5.26 , 8.27)
Digestive System	6.92	(5.49 , 8.50)	9.65	(7.87 , 11.16)
Genitourinary System	6.45	(5.07 , 7.99)*	3.60	(2.54 , 4.80)
Skin & Subcutaneous System	3.81	(2.75 , 5.06)	2.50	(1.66 , 3.61)
Musculoskeletal	9.36	(7.68 , 11.16)*	21.07	(19.24 , 22.59)
Congenital Anomalies	0.48	(0.17 , 1.05)	0.57	(0.23 , 1.18)
Symptoms, Signs, & Ill-Defined	2.54	(1.69 , 3.61)	1.41	(0.79 , 2.30)
Injuries	14.53	(12.50 , 16.65)	12.42	(10.56 , 13.96)
Adverse Effects	3.17	(0.23 , 1.20)	0.52	(0.19 , 1.11)
Supplemental	0.58	(2.22 , 4.33)	3.03	(2.05 , 4.25)
Multiple Categories	17.60	(15.32 , 19.91)	19.51	(17.65 , 20.94)

*Significant difference between Vietnam veterans and Gulf War Veterans diagnostic category proportions.

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13. ABSTRACT ***(Maximum 200 words)***

Post-conflict hospital admission rates of Marine Corps units deployed to the Gulf War were compared with the rates of similar units returning from the Vietnam Conflict. Overall, and in four of the five postdeployment years, the aggregated Gulf War veterans exhibited lower hospitalization rates than did their Vietnam counterparts. Separately, the infantry and service support units deployed to the Gulf War theater had lower postdeployment hospitalization rates than did the Vietnam veterans. There were no significant hospitalization rate differences between the cohorts of combat engineer and artillery units. Of the veterans that were hospitalized, personnel from both conflicts averaged 1.2 admissions. In comparing hospital admission categories, differences existed between the Vietnam and Gulf War veterans in their proportions of 'Infective and Parasitic' diseases, 'Genitourinary' disorders, and 'Musculoskeletal' disorders; Vietnam veterans had the higher proportions within the first two categories, and Gulf War veterans had a higher proportion of musculoskeletal disorders. The data suggest that Gulf War veterans are not at an increased risk of hospitalization when contrasted with veterans returning from a previous combat engagement, and that the categories of illnesses for which Gulf War veterans are hospitalized do not substantially differ from those incurred by a previously-deployed combat cohort.

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